Robust Summary - Polyethylbenzene Bottoms Stream

Biodegradation

Test Substance:	Polytheylbenzene Bottoms Stream (PEB) is 100% of the complex mixture CAS RN. 68987-42-8. PEB is a coproduct of ethylbenzene manufacture and a Class II complex mixture consisting of various isomers of alkylbenzene and diphenyl hydrocarbons.
Method/Guideline:	OECD Method 301 D (1992)
Type (test type):	Aerobic biodegradability (Ready)
GLP:	**Yes**
Year (study performed):	**2005**
Inoculum:	Secondary effluent from a wastewater treatment plant
rest Conditions:	Secondary effluent from the Columbia Wastewater Treatment Plant (Columbia, Missouri) was collected and brought into the laboratory. Approximately 0.5 L of the secondary effluent was filtered through glass wool, with the first 200 mL of filtrate being discarded. Seventy milliliters of the filtrate was reserved and added to 14 L of nutrient medium (0.5mL/L). The inoculated mineral salts medium was aerated at 20 °C for approximately 4 days before use. Bulk testing solutions were prepared in 4-L Nalgene carboys by adding 3,992 mL of inoculated medium to each of three carboys followed by either 8 mL of sodium benzoate stock solution (reference substance treatment at 2 mg/L nominal concentration), 8 mg of test substance plus 8 mL of reagent water (PEB Blend treatment at 2 mg/L nominal concentration), or 8 mL of reagent water (control). The bulk test solutions were stirred for at least 30 min. Each testing solution was transferred to 10 clean BOD bottles by draining from the carboys. All BOD bottles were sealed without any headspace using glass stoppers. Duplicate BOD bottles were randomly designated for sampling, and Day-O bottles were removed for dissolved oxygen analyses. The remaining bottles were incubated in the dark on an orbital shaker in an environmental chamber set at 20 "C. Dissolved oxygen measurements were measured using a dissolved oxygen meter and probe on Days 0, 8, 14, 21, and 28. Solution pH was measured on Day 0 and 28. Bacterial plate counts were performed on the inoculated mineral salts at initiation and one of the duplicate BOD bottles for each treatment at Day 28. The mineral salts solution at the beginning of the test was 1.4 x 10^5 colony forming units (CFU)/mL, while Day 28 solutions of the control, reference substance, and the test substance contained 1.8 x 1 0^4, 7.5 x 1 0^3, and 6.5 x 10^3 CFU/mL, respectively, and indicated that the microbial inoculum remained viable through the end of the test in each experimental group. Biochemical oxygen demand (BOD) was calculated from the measured oxygen concentrations taken in the BOD bottles using the following equation: $$BOD\ (mg\ O_2/mg\ substance) = (DO_T - DO_B)/C_T,$$ where DO_T = dissolved oxygen uptake for the test or reference

	substance (mg O_2/L), DO_B = dissolved oxygen uptake in the blank (mg O_2/L), and C_T = test concentration of the test or reference substance (mg/L). Biodegradation of the test and reference substances was calculated as a percentage of the theoretical oxygen demand (ThOD) using the following equation: % Biodegradation = (BOD/ThOD) x 100 The ThOD was determined to be 1.67 mg O_2/mg for sodium benzoate and 3.09 mg O_2/mg for PEB Blend using elemental analyses and the equation for ThOD without nitrification in the OECD guideline.
Results: Kinetic for each time period: Breakdown products:	PEB Blend: 7.1 % biodegradation after 28 days Sodium Benzoate: 88.6 % biodegradation after 28 days Percent Biodegradation Day / PEB Blend / Sodium Benzoate 8 / 0 / 82.9 14 / 3.7 / 83.8 21 / 1.8 / 83.5 28 / 7.1 / 88.6 N/A There were no deviations from the protocol or guideline.
Conclusions: (Laboratory Contractor)	The test substance showed a maximum of 7.1% biodegradaton throughout the 28-day test indicating that PEB Blend is not readily biodegradable.
Reliability:	**1.** Reliable without restrictions.
Reference:	Serak, Kelda. 2005. Determination of the Ready Biodegradability of Polyethylbenzene Bottoms Stream Blend (PEB Blend) Using the Closed Bottle Test Method. ABC Laboratories, Inc., Columbia, MO. Sponsor: American Chemistry Council, Arlington, VA
Other (source) Last changed	